

# What do we mean by population-level approaches to dementia risk reduction?

## The IRNDP Symposium at ADI 2022

This is a summary of the key points raised at the symposium sponsored by IRNDP at ADI 2022 entitled: 'What do we mean by population-based approaches to dementia risk reduction?', held on the 10<sup>th</sup> of June 2022.

### Prepared by:

Dr Sebastian Walsh, NIHR Doctoral Fellow, University of Cambridge

### Contributors:

Professor Kaarin Anstey, Dr Ruth Peters, Dr Nikki-Anne Wilson, Professor Frank Lin, Professor Blossom Stephan, Professor Edo Richard, Dr Ishtar Govia, Professor Carol Brayne

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# Introduction

Kaarin Anstey

**Professor of Public Health at University of New South Wales, and Chair of IRNDP**



Professor Anstey welcomed everyone to the symposium, including how delighted she was to be introducing four excellent speakers to talk today about this important topic, each from a different country and with a different research focus. Professor Anstey noted that each speaker had been asked to talk to their own experiences and perspectives on population-based approaches to dementia risk reduction.

# Speakers

Frank Lin

Professor of Otolaryngology & Epidemiology at Johns Hopkins Bloomberg School of Public Health



**Take Home Point:** Results from an RCT of the effect of hearing aids on cognitive decline in older adults 70-84 years with mild/moderate hearing loss will be available by early 2023.

Professor Lin began by explaining the basic pathophysiology of hearing loss, before moving on to present the observational evidence of a link between hearing impairment and dementia. He noted that, the 2-, 3- and 5-fold increases in dementia risk observed for those with mild, moderate, and severe hearing loss respectively, translated into hearing loss being the single largest potentially modifiable risk factor for dementia in the Lancet Commission on dementia prevention, intervention, and care<sup>1</sup>. This is because of the very high prevalence of hearing loss i.e. >2/3 of over 70-year-olds have hearing loss globally.

Professor Lin then discussed three hypotheses of why age-related hearing loss may be causally linked to cognitive decline, explaining that they are not mutually exclusive, and there is increasing evidence to support each theory:

1. Increased cognitive load. Hearing loss results in deteriorated encoding of auditory information in the cochlea. This leads to degraded auditory information reaching the brain, thereby increasing the cognitive load on the brain to process this information (so called 'effortful listening'). This means the brain is drawing upon extra cognitive resources that could otherwise have buffered against pathology.
2. Brain structural changes. The increased cognitive load caused by hearing loss leads to structural changes in the brain, such as accelerated brain atrophy and altered functional connectivity.
3. Social isolation. Hearing impairment leads to the individual becoming more socially isolated, which is an identified risk factor for dementia in its own right.

Professor Lin then moved on to ask a key question: do hearing aids reduce this risk? He explained that we cannot answer this question with the high-quality observational data examined to date, due to the risk of confounding (more affluent people will have more access to hearing aids). He is therefore leading a randomised control trial which recruited 977 people ages 70-84 years from the USA with mild to moderate hearing loss from 2018-19 and randomly allocated half to receive a hearing aid, and half to receive health advice only. The primary outcome is cognitive decline, measured using a neurocognitive test battery (incident dementia and mild cognitive impairment are secondary outcomes). The results, after 3 years of follow up, are expected in early 2023.

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<sup>1</sup>Livingston G, Huntley J, Sommerlad A et al. Dementia prevention, intervention, and care: 2020 report of the Lancet Commission. The Lancet. 2020 Aug 8;396(10248):413-46.

## Blossom Stephan

Professor of Neuroepidemiology and Global Ageing at the University of Nottingham



**Take Home Point:** There is evidence that the age-standardised population prevalence of dementia is decreasing in high-income countries. We should look to evidence-based population-based approaches against the identified modifiable risk factors for dementia, applying a life course and health equity lens.

Professor Stephan outlined that she would be focussing on dementia prevention in the UK. She first introduced the two approaches to prevention, as described by Geoffrey Rose<sup>2</sup>:

1. Individual approach. Identify high-risk individuals from the population using risk scores (e.g. CAIDE, ANU-ADRI) and target interventions at those individuals.
2. Population approach. Affect societal conditions to reduce risk across the whole of society.

She noted that both approaches are valuable in a balanced strategy, but that population approaches are particularly powerful to achieve reductions in dementia prevalence.

Whilst cohort studies have suggested a reduction in age-standardised population prevalence of dementia, notably the CFAS data in the UK, Professor Stephan explained that the mechanism(s) for these changes is/are not clear. However, the Lancet Commission on dementia prevention, intervention, and care has identified 12 potentially modifiable risk factors for dementia from observational data. In a recent systematic review, currently under peer review<sup>3</sup>, examining the cost-effectiveness of population approaches to reduce dementia and its risk factors, no studies were identified that demonstrated direct effects on dementia prevalence. Therefore, Professor Stephan recommended that we should look to population interventions against the modifiable risk factors.

Professor Stephan then provided some evidence-based examples of UK policies that follow the population approach, that have targeted the modifiable risk factors for dementia, splitting them into 3 groups:

1. Legislative. Increased minimum age of education, plain cigarette packaging.
2. Public Awareness Campaigns. National 'Eat Well'/'Live Well' health promotion campaigns for healthy diet/healthy lifestyles, temporary road closures and cycle lanes to increase physical activity, national no smoking day.
3. National policies. NICE guidance on midlife approaches to preventing later life frailty and dementia, NHS Health Check (which, since 2018, includes giving information on dementia risk to all those aged >40, previously only given to >60s), the 'Prime Minister's Challenge on Dementia' and more recent 'Dementia MOONSHOT'.

She also emphasised the vital importance of thinking about risk factors from a 'lifecourse perspective' (from in utero conditions through childhood, midlife, and older people), and recognising that the modifiable risk factors for dementia often occur simultaneously in clusters.

To finish, Professor Stephan offered some key considerations for selecting population-based dementia prevention interventions:

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<sup>2</sup> Rose GA, Khaw KT, Marmot M. Rose's strategy of preventive medicine: the complete original text. Oxford University Press; 2008.

<sup>3</sup> A link will be available on the IRNDP website after publication.

- Is the intervention effective? To answer this question, we require: population data on prevalence/incidence, data on intervention effectiveness, data to ensure that the intervention is not widening inequalities, acknowledgement of the challenges with clustering of risk factors and the long duration of development of pathology.
- Is the intervention relevant to the target population? Individuals make choices in the context of their larger environmental, social, and cultural context. Intervention must be tailored.
- Is it cost-effective? In addition, funding needs to be long-term and sustainable.

## Edo Richard

Professor of Neurology, Radboud University Nijmegen Medical Center



**Take Home Point:** We need a combination of ‘individual approaches applied to the population’ and societal interventions. This talk presents some key considerations to guide the former: what do we target, who do we target, how do we engage them, and when do we intervene?

Professor Richard also started by outlining different approaches to prevention, but argued that ‘population approaches’ could be further split into two groups:

1. ‘Individual approaches applied to the population’. Interventions which act an individual level, but within programmes that are scaled to large groups. For example, the NHS Health Check programme (to use an example from Professor Stephan’s talk).
2. ‘True public health interventions. In line with societal interventions that Professor Stephan described, such as increasing the minimum age of education, and building cycle lanes.

The talk then focussed on posing key questions to consider when pursuing the first category:

- How should we determine which risk factor to target, and at what level to target them?
  - Pick the most prevalent risk factors, for example hypertension.
  - Recognising the U-shaped relationships between risk factors like hypertension and dementia, we need to develop targeted approaches. Lower may not always be better.
- Who from the population should we target?
  - We need to target the large group of people at intermediate risk, as this is where the most people and most population risk is (in line with Rose’s hypothesis outlined by Professor Stephan).
  - To do this, we need affordable and accessible ways of risk stratifying the population (i.e. tools that use readily available data like sociodemographic information, rather than expensive PET scans)
- How do we reach and engage those people?
  - ‘eHealth’ and ‘mHealth’ approaches show promise. HATICE is a randomised controlled trial that utilised computer-based health coaching, and achieved an improved risk profile amongst participants. PRODEMOS is an ongoing trial, that takes this further by using a smartphone app in a deprived population from the UK, and a higher risk population from China.
  - mHealth potentially enables reaching people from lower socioeconomic backgrounds, in particular in low- and middle- income countries (LMICs), where phone ownership is increasing rapidly.
  - But how do we engage individuals? A qualitative study in Netherlands with people from low socioeconomic backgrounds found that their perceived influence on health was low, their self-efficacy for behaviour change was very low, that healthy lifestyle is viewed as a ‘sacrifice’, that physical complaints/experiencing a primary event is a motivator, and good social networks are a facilitator of engagement.
- When should we intervene?
  - These kinds of interventions aim for ‘primary’ prevention in the years between risk factor development and cognitive decline. Whilst ‘true public health interventions’ could also be utilised as ‘primordial’ prevention in the decades before.

## Ishtar Govia

Senior Lecturer in Epidemiology at the Caribbean Institute for Health Research



**Take Home Point:** Because of the current and projected burden of dementia lays disproportionately in LMICs, prevention approaches must be easy, affordable, and appropriate to these settings. If this is achieved, population-based approaches could turn the tide on the increasing prevalence in dementia in LMICs and, by extension, globally.

Dr Govia began by defining population-based approaches to dementia prevention as ‘measures applied to populations, groups, areas, jurisdictions, or institutions with the aim of changing the social, physical, economic, or legislative environments to make them less conducive to the development or maintenance of the modifiable lifecourse risk factors for dementia’.

Referencing Professor Richard’s finding that people consider healthy lifestyles a ‘sacrifice’, Dr Govia pointed out that following the definition she laid out would lead to policies that drive ‘unconscious’ behaviour change (i.e. the healthier choice becomes the easier or default option).

Dr Govia then provided a series of examples of evidence-based policies (developed and informed by relevant systematic reviews, meta-analyses, RCTs etc.) already in place in Jamaica, which could be expanded, adapted, and applied elsewhere.

- A 2019 ban on sugary drinks in and around school environments, coupled with policies to mandate the availability of healthy foods options in schools.
- The Jamaica Early Childhood Stimulation Programme – a 1987-1989 home-based programme for children from deprived areas of Kingston, which improved nutrition, psychosocial and cognitive stimulation, and the mother/child relationship.
- The Second Chance Programme – adolescents aged 16-30 with risk factors like low education, or being teenage parents, unemployed, drug users, or having criminal records; were offered training and education to improve their life chances.
- Several initiatives to increase helmet usage when riding motorcycles and motorbikes, aimed at reducing traumatic brain injury.

Dr Govia also referenced an upcoming paper (the same paper referenced by Professor Stephan), which identified successful interventions from elsewhere, including: mass media smoking cessation campaigns, and built infrastructure changes to increase physical activity. Dr Govia highlighted the need to design and test more initiatives focused on gender-based violence (GBV) given GBV’s link with traumatic head injuries and other risk factors for dementia. Crucially, evidence needs to be generated in, for, and by LMICs, including small island developing states.

Finally, we must engage policymakers in the population-based dementia prevention agenda. We should leverage opportunities such as the Caribbean Cooperation in Health (regional framework to address health and development goals). The inequities in dementia risk are, by definition, multi-sectoral, and multigenerational. Solutions require us to work collaboratively and bring different areas of expertise together.



# Q&A

Ruth Peters

Associate Professor of Public Health at University of New South Wales



**if you could only target one risk factor, in a resource constrained context, what would you choose?**

Professor Stephan: Educational attainment. Because of the lifecourse cumulative effects of being better educated.

Dr Govia: Agree, education. But also, pollution and environmental factors. We need more multi-national collaborative action, recognising that LMICs are often disproportionately affected by downstream effects of decisions taken by high-income countries.

Professor Richard: Agree from a public health perspective. From an individual perspective, it would be hypertension. Diagnosis and drugs are cheap, and it's a very common condition so has potential to have a large effect at the population level.

**Dr Peters: Considering clustering of risk factors, how realistic is it to tackle multiple risk factors with population-level interventions, across different places and times?**

Professor Richard: To add to the question: how do you actually reach the people that need it? For example, NHS Health Checks could do this, but does it actually reach those that need it?

Professor Stephan: Interventions need to be culturally appropriate and targeted. To achieve this we need to co-produce interventions with communities.

Dr Govia: We need to leverage opportunities that present themselves. For example, COVID proved that government agencies can operate rapidly in an integrated, holistic way to tackle complex problems, including passing legislation. Now we need to recreate those kinds of opportunities for dementia prevention. Crucially, this policy action must be aimed at driving unconscious behaviour change, and addressing geopolitical inequities.

Professor Richard: In my clinic room, people from low socioeconomic backgrounds report a deep mistrust of government and feel abandoned. We need to invest in addressing this mistrust, and in reaching and engaging these groups. For example, in the PRODEMOS trial, we approached those from the 3 most socio-economically deprived deciles of the population, and our response rate was only around 5%.

Dr Govia: We need to move past thinking only in a biomedical perspective. These groups are only 'hard to reach' if you want to bring them into a clinical trial environment. They aren't hard to reach, we know who and where they are, and what they want. These populations do want better lives, better air quality, better education, better living conditions. But we need to develop at-scale interventions that are appropriate to these groups.

Professor Stephan: We should also challenge ourselves to think: should the onus be on the individual? Or should we focus on modifying the environment so it's more conducive to making healthier choices?

Professor Richard: We need both types of approaches. We also need to have different approaches in high- and low-income settings.

Professor Stephan: agreed. NHS Health Check is an example of something that is available to everyone, but it also targets and individualises the intervention.

Dr Govia: we need to generate a conversation with different voices, in order to understand what the shared principles (across disciplines and settings) are, and also understand where we differ.

Dr Peters: **We've talked about the lack of evidence, but also the need for action. Should we be focusing on more research or more policy action?**

Professor Richard: Evidence-based medicine is important, but for somethings we'll never get the evidence. We could implement true public health approaches (and should still thoroughly evaluate their effectiveness), but for individual interventions we do need a high level of evidence.

Dr Govia: We need to clarify the 'best buys' for different settings. We have enough evidence in some settings that we need to make an investment in public health approaches, and we need to do that by bringing the stakeholders (including policymakers) together. In other contexts, we do need more research.

Dr Stephan: Given the trends we've seen in high income countries, we know it's possible to reduce population prevalence, so we can't do nothing. We need to ensure we see the same trends globally.